

REMARKS

Amendments to the Claims

Claims 1 and 3-10 are under examination with entry of the present Amendment. Claim 1 has been amended. Claim 11 is newly added.

Claim 1 has been amended for clarity to recite that the ceramic fibres and ceramic powder provides direct ceramic-to-ceramic contact. Support resides in the as-filed specification for example, Figures 3A, 3B, 3C and 3D, and in paragraph [0028] which states that "the fibres act as a physical restraint to the ceramic powder."

New claim 11 recites that the ceramic fibres are formed of uncoated material. Support resides in the as-filed specification for example, in paragraph [0029] which describes the fibre matrix being formed "from randomly oriented fibres into a highly porous mat or felt" or "in the form of a commercially available alumina fibre paper, as received from the manufacturer in an uncompressed state, and without the ceramic particles." It will be recognized by one skilled in the art that prior to forming the seal, the ceramic fibres are not coated or formed of any coated material. The term "uncoated" excludes any coated fibre and as such, is distinguished from the metallic coated fibres of Luthra.

As the ceramic fibres and particles are uncoated, and any organic material burns off when fired, there is inherently ceramic-to-ceramic contact within the seal.

No new matter has been added with the amendments made herein. Support for the amended and new claims is found throughout the application and in the as-filed claims. Applicants believe that the amended and new claims better define the invention in a manner supported by the original application, and in a manner so as to render moot the rejections as set out below.

Rejections under 35 U.S.C. §102(b)

Claims 1 and 3-10 are rejected as being anticipated by US Patent No. 4,933,309 to Luthra for the reasons set out on pages 2-5 of the Office Action.

In the interest of advancing prosecution but without acquiescing to this rejection, Applicants have amended independent claim 1 to better define the specific structural features of the invention, and to include language which more clearly distinguishes from Luthra. Amended claim 1 recites that the ceramic fibres and ceramic powder are in direct ceramic-to-ceramic contact. Support resides in the as-filed specification for example, in paragraph [0028] which states that “the fibres act as a physical restraint to the ceramic powder.” There is thus direct physical contact between the ceramic fibres and the ceramic powder within the claimed seal (i.e., ceramic to ceramic contact). Figures 3A, 3B, 3C and 3D illustrates this direct contact.

The ceramic fibres form the skeleton of the claimed seal to provide strength and flexibility. The ceramic powder is interspersed and physically restrained within the ceramic fibre matrix to provide optimal sealing performance, and to fill the voids in the ceramic fibre matrix to form an impervious seal. The ceramic fibres and the ceramic powder are thus in direct physical contact with each other to form the seal.

Evidence of such physical contact is provided by the as-filed scanning electron micrographs. Figure 2 is a SEM of ceramic fibres prior to loading with ceramic powder, showing voids in the ceramic fibre matrix (paragraph [0030]). In comparison, Figures 3C-D are SEMs of formed seals in cross-section, showing that the void space in the matrix has been substantially reduced due to filling of the ceramic fibre matrix by the ceramic powder (paragraph [0043]). It can also be seen that the ceramic powder is in direct contact with the ceramic fibre, a physical connection which confers the sealing performance. As described in the as-filed specification (highlighting added for emphasis),

the particles block the potential leakage paths or create a very torturous leak path for the gases, providing a non-hermetic but effective seal. The fibres act as a physical restraint to the ceramic powder, allowing the shape to be formed and maintained throughout its service life. The ceramic powder is packed into the alumina matrix, but is not sintered into a contiguous member and remains unsintered at the operating temperatures of the fuel cell, which may be typically in the range of 500°C to 1000°C. Because the ceramic components of the seal are not sintered, the seal may flex or experience thermal expansion or contraction without breaking down (paragraph [0028]).

It is axiomatic to a finding of anticipation that the reference teaches each and every element of the claim. “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference” (*Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987); see also MPEP 2131). Applicants submit that Luthra does not expressly or inherently disclose all claim limitations.

Luthra does not teach or suggest ceramic fibres providing a matrix for physically restraining ceramic powder wherein the ceramic fibres are in contact with ceramic powder, as recited in amended claim 1. There is no direct physical contact between the ceramic fibres and the ceramic powder, since the final composite of Luthra intentionally requires a metallic coating to prevent direct physical contact between the fibrous material and ceramic matrix. The metallic coating overcomes the problem of clamping/bonding and chemical reactions at the fibre/matrix interface (col. 1, lines 34-38):

Each method of producing the composite includes providing the desired fibrous material and coating it with the noble metal. In each production method, any volatilization of the coating of noble metal should leave none, or no significant portion of, the fibrous material exposed; i.e., it should leave none, or no significant portion, of the fibrous material in direct contact with the matrix in the final composite (col. 2, lines 12-19, emphasis added).

...

The metallic coating should leave none, or no significant portion, of the fibrous material exposed (col. 2, 54-56).

...

The coating of noble metal bars contact, or bars significant contact, between the matrix and fibrous material. In the present composite, there is no reaction product, or no significant amount of reaction formed directly between the ceramic matrix and the fibrous material. Preferably, there is no reaction product formed directly between the ceramic matrix and the fibrous material which is detectable by scanning electron microscopy. Also, there is no significant reaction between the metallic coating and the matrix or fibrous material. Generally none of the coated fibrous material in the composite, or no significant portion thereof, is exposed (col. 5, lines 15-17, emphasis added).

As shown in Figures 1A-B and 2A-B, Luthra discloses filaments coated with a noble metal such as iridium. The final composite of Luthra (i.e., metallic coating to ceramic) is clearly different than Applicants' claimed seal (i.e., ceramic to ceramic contact).

Absent such a teaching, Luthra does not disclose each element of the present claims and therefore cannot anticipate. Consequently, the Office Action cannot rely on Luthra for providing an explicit or inherent disclosure of the seal as claimed. Thus, the language of Applicants' amended claim 1 (and dependent claims 3-10) distinguishes the teachings of Luthra. Reconsideration and withdrawal of this rejection are requested.

CONCLUSION

In view of the foregoing remarks and amendments, it is respectfully submitted that this application is in condition for allowance and allowance thereof is respectfully requested.

Respectfully submitted,

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